

**Supplementary Data for:**

**Rational design of COF-MOF composites for ratiometric fluorescence  
detection of phosphate**

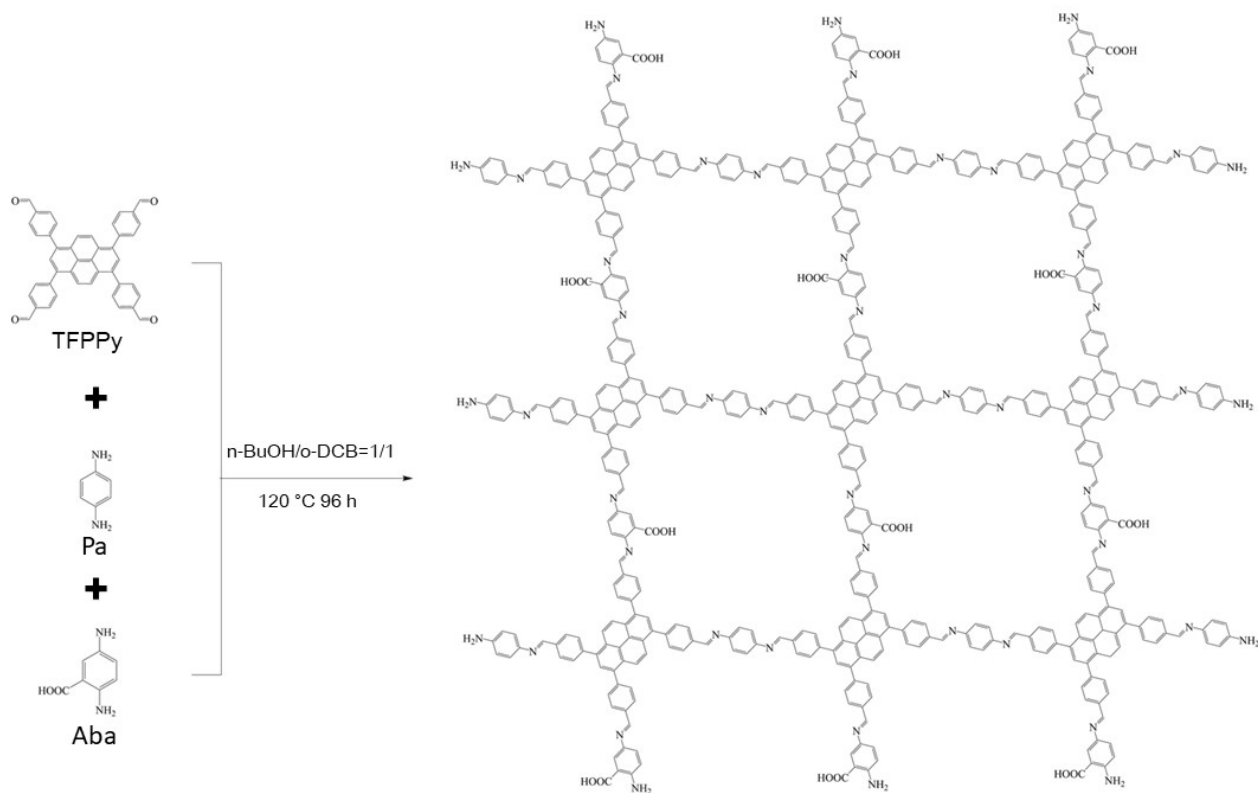
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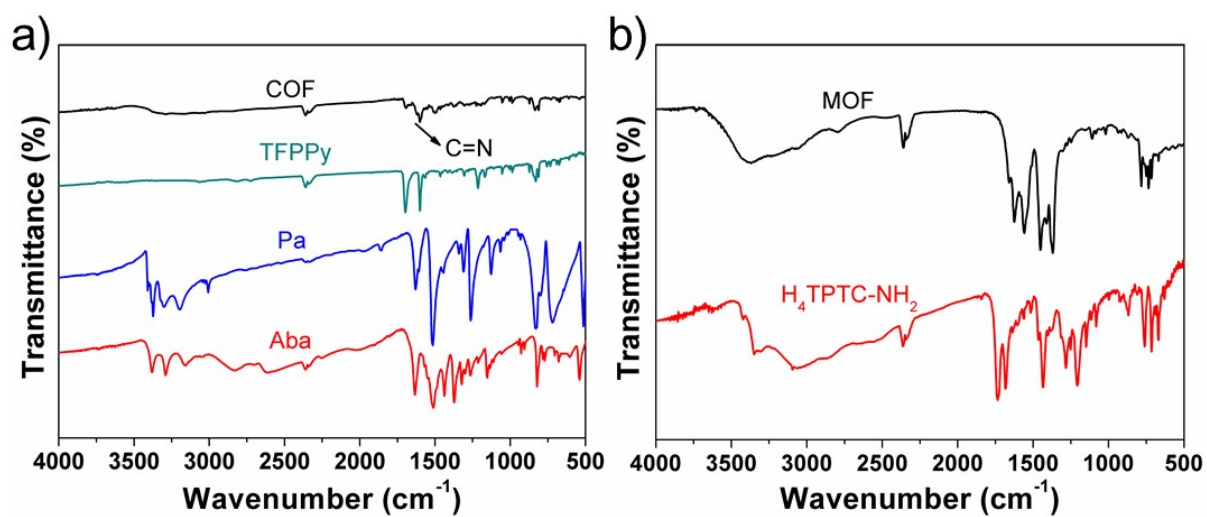
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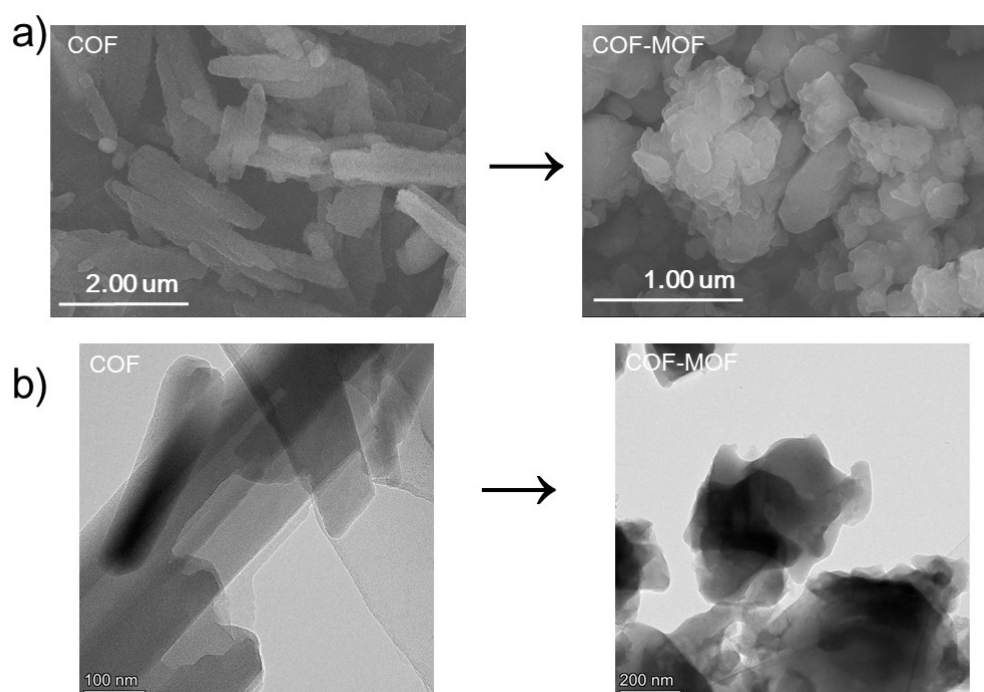
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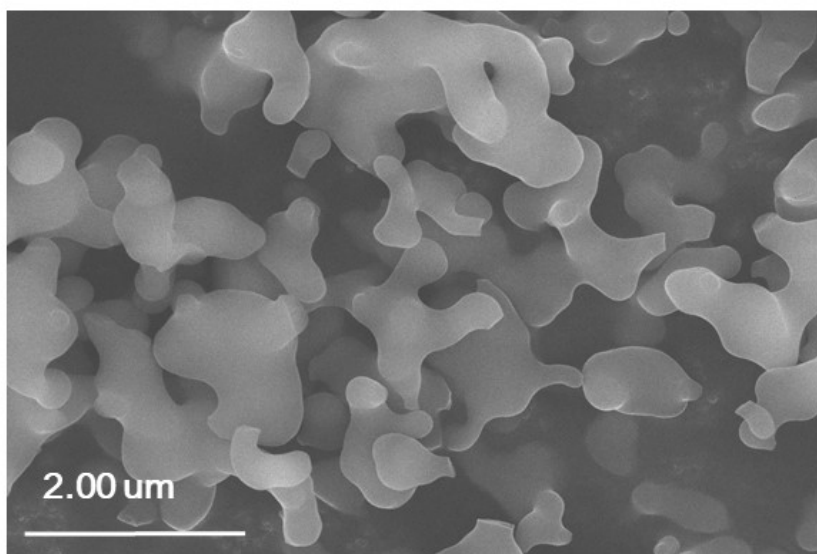
**Fig. S1.** Illustration for the synthesis of COF via the condensation reaction between TFPPy, Pa and ABA.



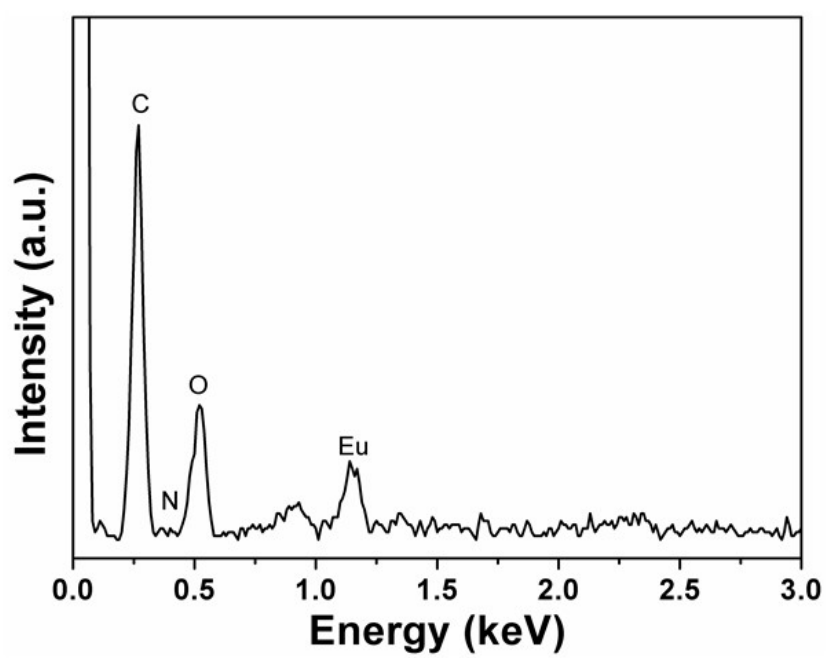
**Fig. S2.** (a) FT-IR spectrum of COF, TFPPy, Pa and Aba; (b) FT-IR spectrum of  $\text{H}_4\text{TPTC-NH}_2$  and MOF.



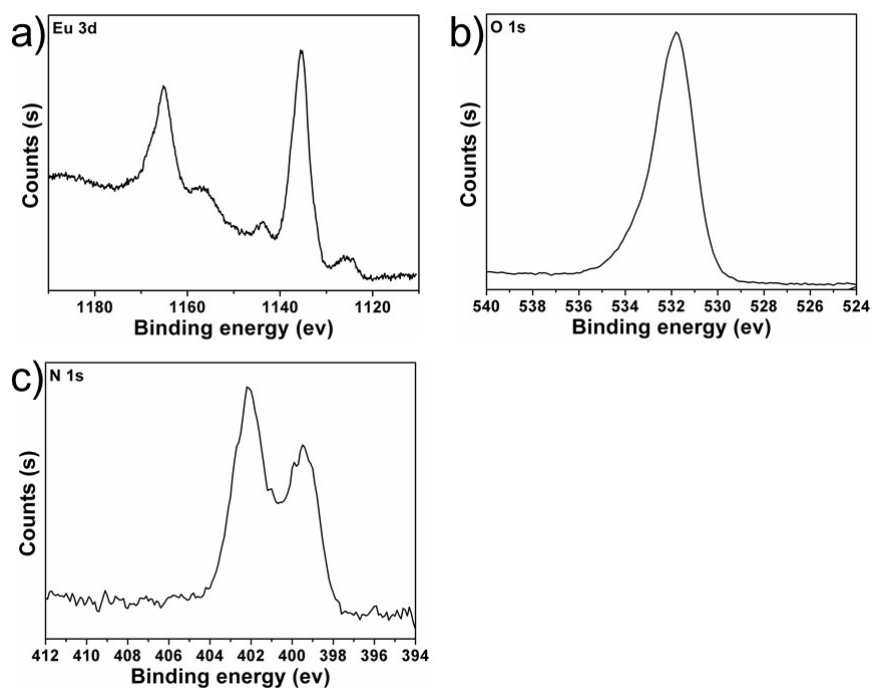
**Fig. S3.** SEM and TEM images of COF and COF-MOF.



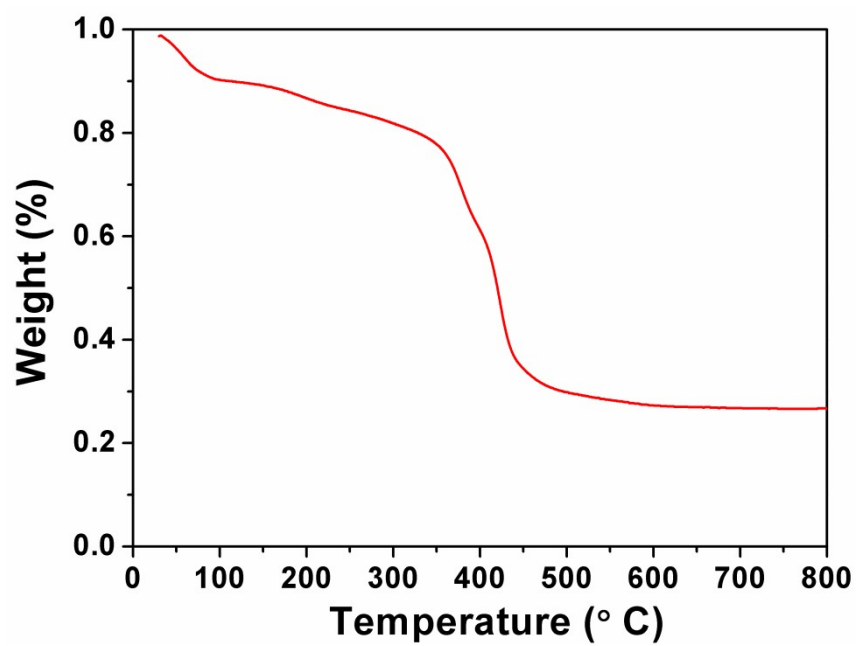
**Fig. S4.** SEM images of MOF.



**Fig. S5.** The EDX element analysis of COF-MOF.



**Fig. S6.** The XPS spectrum of Eu 3d (a), O 1s (b) and N 1s (c) for COF-MOF.



**Fig. S7** TGA spectrum of COF-MOF.

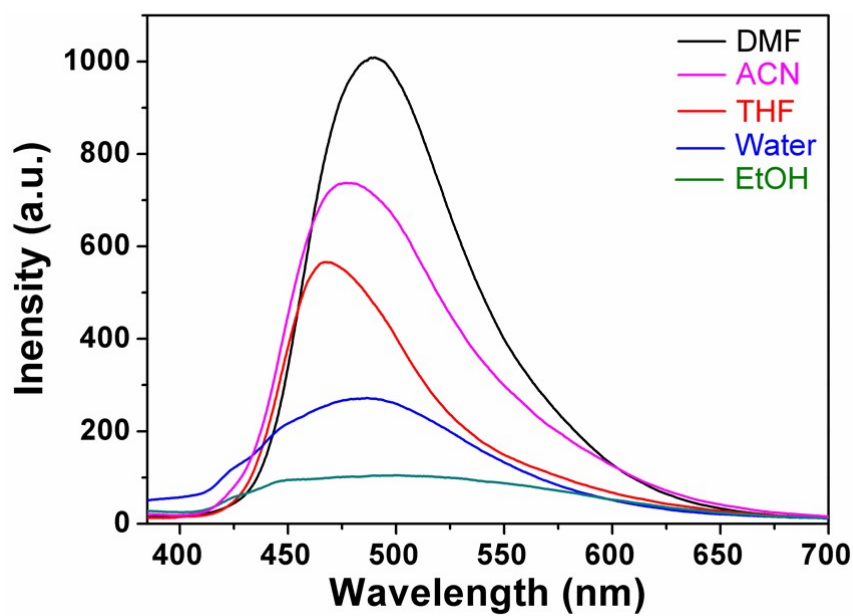


Fig. S8. The fluorescence spectrum of COF-MOF in different solvent.

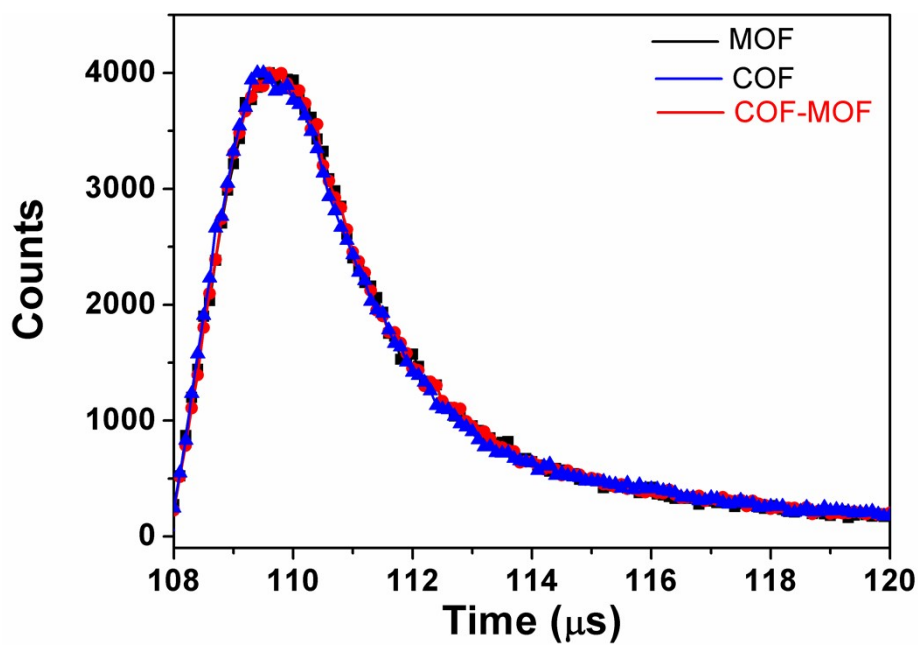
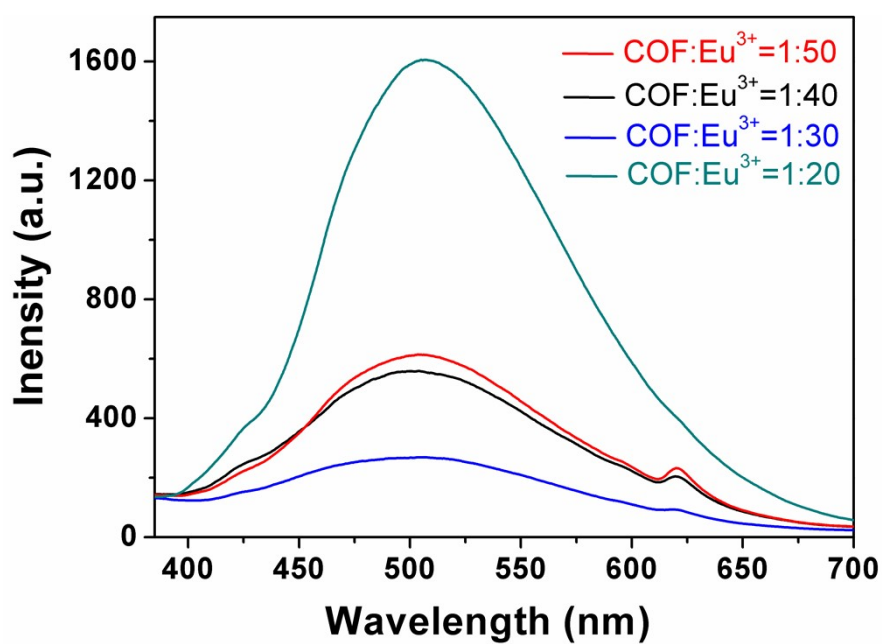
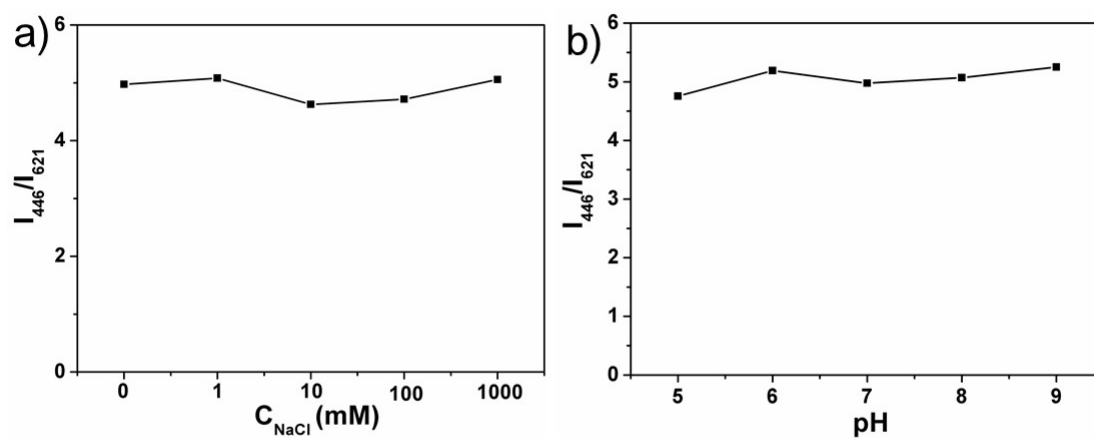


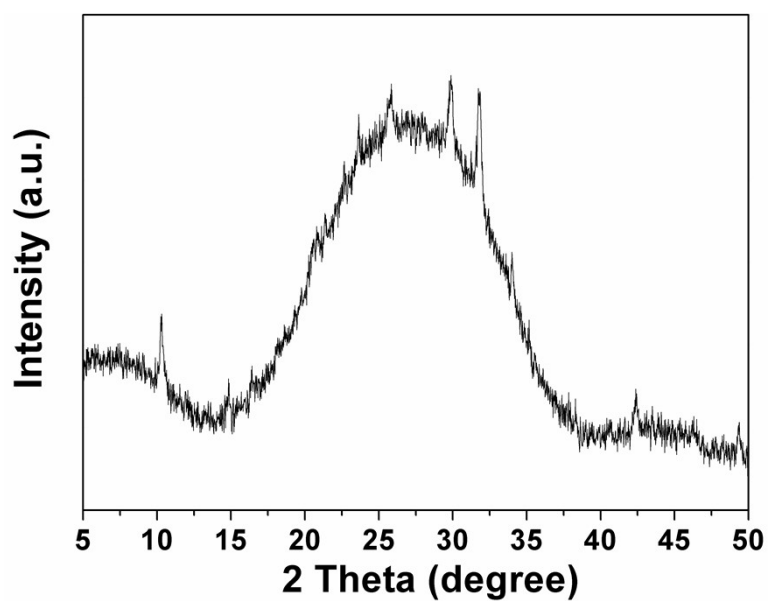
Fig. S9. The fluorescence lifetime of COF, MOF and COF-MOF.



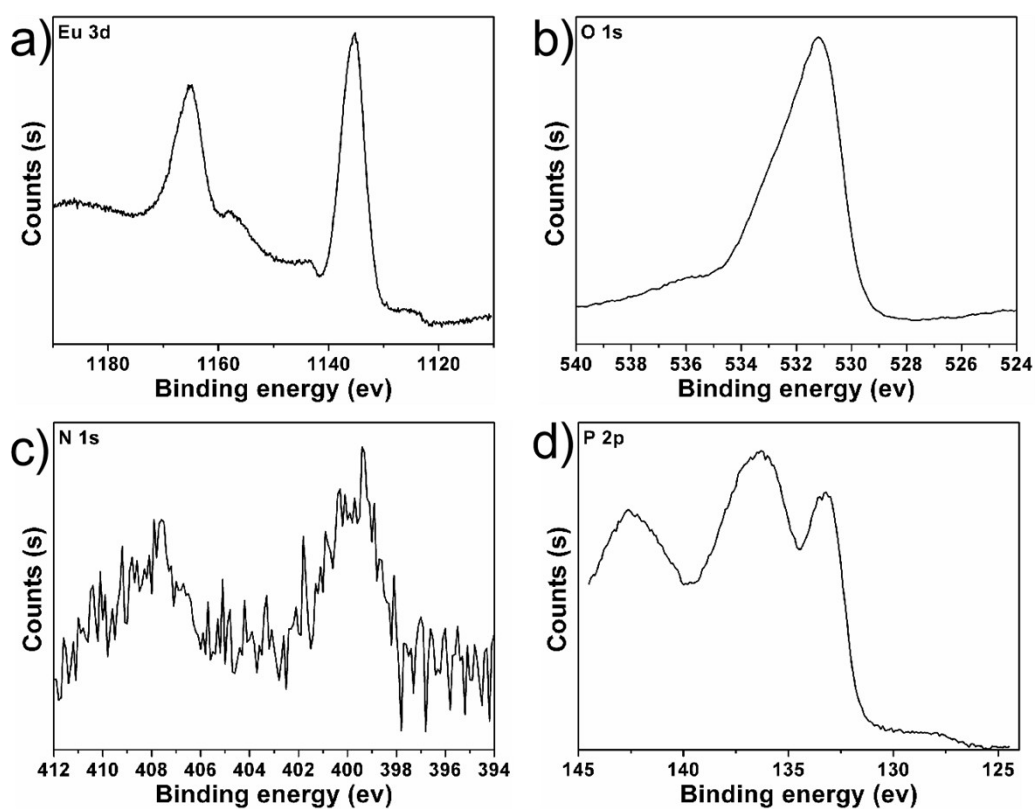
**Fig. S10.** The fluorescence of COF-MOF with different mass ratio of COF/  $\text{Eu}^{3+}$ .



**Fig. S11** The fluorescence stability of COF-MOF in different concentration of NaCl (a) and pH (b).

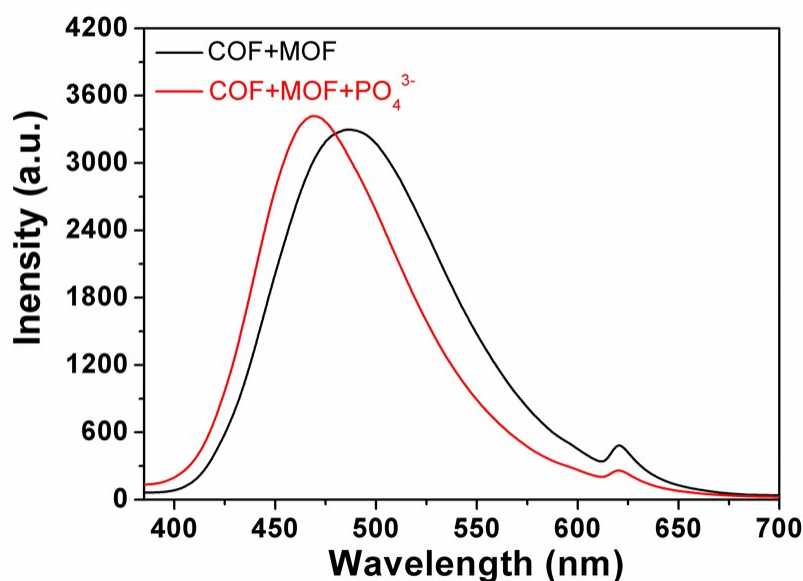


**Fig. S12.** The XRD of COF-MOF after phosphate addition.



**Fig. S13.** The XPS spectrum of Eu 3d (a), O 1s (b) , N 1s (c) and P 2p (d) for COF-MOF after phosphate addition.





**Fig. S14.** The fluorescence spectrum of COF + MOF before or upon 100  $\mu\text{M}$  phosphate addition.

**Table S1**

Comparison of analytical performance for phosphate detection by our strategy and those reported in literature

Method	Detection Limit ( $\mu\text{M}$ )	Strategy	Ref.
Fluorescent	0.39	A Terbium(III)-Complex-Based On–Off Fluorescent Chemosensor for Phosphate Anions in Aqueous Solution and Its Application in Molecular Logic Gates	1
Fluorescent	2	MOF@COFs with Strong Multiemission for Differentiation and Ratiometric Fluorescence Detection	2
Fluorescent	10	A Water-Stable Lanthanide-organic Framework as a Recyclable Luminescent Probe for Detecting Pollutant Phosphorus Anions	3
Fluorescent	1	A Postsynthetically Modified MOF Hybrid as a Ratiometric Fluorescent Sensor for Anion Recognition and Detection	4
Fluorescent	0.61	Imine-Linked Covalent Organic Framework with a Naphthalene Moiety as a Sensitive Phosphate Ion Sensing	5
Fluorescent	1.25	Metal–Organic Frameworks with Inherent Recognition Sites for Selective Phosphate Sensing through Their Coordination-Induced Fluorescence Enhancement Effect	6
Fluorescent	0.81	Phosphate Ion Targeted Colorimetric and Fluorescent Probe and Its Use to Monitor Endogeneous Phosphate Ion in a Hemichannel-Closed Cell	7
Fluorescent	0.95	COF-MOF based ratiometric fluorescence detection of phosphate	This work

**Table S2**

Analytical Results for the Determination of phosphate in water samples.

Samples	Spiked phosphate / $\mu\text{M}$	Concentration found (mean $\pm$ <i>s</i> , <i>n</i> = 3)	PBS <sup>a</sup> method (mean $\pm$ <i>s</i> , <i>n</i> = 3 )
Tap water	0	Not detected	---
	50 $\mu\text{M}$	49.2 $\pm$ 1.2 $\mu\text{M}$	---
	25 $\mu\text{M}$	24.8 $\pm$ 0.5 $\mu\text{M}$	---
Lake water	0	Not detected	---
	50 $\mu\text{M}$	51.3 $\pm$ 1.3 $\mu\text{M}$	---
	25 $\mu\text{M}$	25.4 $\pm$ 0.7 $\mu\text{M}$	---
Human urine 1	0	11.66 $\pm$ 0.22 mM	11.78 $\pm$ 0.18 mM
Human urine 2	0	10.98 $\pm$ 0.16 mM	11.12 $\pm$ 0.23 mM

<sup>a</sup> PBS:Phosphomolybdenum blue spectrophotometry

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- [4] Lian, X.; Yan, B. A Postsynthetically Modified MOF Hybrid as a Ratiometric Fluorescent Sensor for Anion Recognition and Detection. *Dalton. Trans.* **2016**, 45, 18668-18675.
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